Contribution ID: **68**   Type: **not specified**

Photometric Determination of Main-Sequence Binaries

Thursday, 22 September 2022 11:10 (20 minutes)

The brightness and colour of a star are determined by factors such as mass, age and metallicity but can also be affected by the presence of an unresolved companion. Any discussion of stellar evolution on the H-R diagram must involve a consideration stellar multiplicity. For example, a young binary system at low metallicity may be bright enough such that it resembles an evolved single star at high metallicity. Using simulation-based inference, we show how observations of stars in multiple photometric bands can be used to constrain stellar properties such as mass, age, and metallicity, as well as identify the presence of an unresolved companion and infer its mass. We present preliminary results on a sample of Gaia sources and demonstrate how we can identify binaries based on their positions on the H-R diagram.

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Session Classification: White dwarfs - Asteroseismology - Binaries